

I-77 Feasibility Study (I-85 to Griffith Street)

TIP Project No. FS-0810B

Task Order No. 3 – Use of I-77 Shoulders for Travel Lanes

Sub-task 3.C: Evaluation of Operational Impacts

TECHNICAL MEMORANDUM

(FINAL)

November 18, 2009

1.0 INTRODUCTION

This memorandum summarizes the results of traffic simulation conducted along I-77 for the possible use of shoulders for general purpose traffic between I-485 (Exit 19) and Catawba Avenue (Exit 28).

The traffic simulation and analysis package used in Task Order No. 3, CORSIM, was developed for the Federal Highway Administration (FHWA). CORSIM has the capability to analyze traffic flows on surface street systems as well as freeways, and can consider the effects of additional lanes, on-street parking, bus traffic, and accidents.

For Task Order No. 3, CORSIM was used to:

- Assess the impact of adding an auxiliary lane on I-77 operations
- Assess the system impacts on a comprehensive scale
- Determine freeway residual impacts, if any, resulting from the proposed freeway modifications

1.1 CORSIM MODEL CALIBRATION

The default values of the CORSIM model have not been changed. The calibration for the existing No-Build conditions was not necessary as the speeds, volumes and observed queuing were reasonably close (within 10 percent) to observed existing conditions.

The CORSIM output file was created from the average of three internal CORSIM runs. The output results are the average of three random runs.

1.2 CORSIM NETWORK AND TRAFFIC ANALYSIS

The CORSIM network for Task Order No. 3 was prepared from the base existing conditions network. Using the existing network, the use of shoulders for general purpose traffic was analyzed between I-485 and Catawba Avenue in both directions. These limits were based on input provided by the Technical Steering Committee for the I-77 Feasibility Study. The volumes for this task order came from the Metrolina Regional Travel Demand Model. Traffic analysis was performed based on modeling for possible 2013 opening year conditions which provided AM and PM peak hour volume conditions.

2.0 RESULTS OF TRAFFIC SIMULATION

The following sections summarize the results of CORSIM traffic analysis for the AM and PM peak hours for the year 2013.

2.1 AM PEAK HOUR (SOUTHBOUND)

When compared to No-Build conditions, the level of service would improve by two levels for southbound operations. The level of service improves from a level of service “F” to a level of service “D” at on and off ramp locations and from level of service “E” to level of service “C” along the freeway mainline.

The average speed to travel from the entire CORSIM network from Griffith Street (Exit 30) to LaSalle Street (Exit 12) would improve by eight miles per hour (mph), from 42 mph to 50 mph. Overall vehicular delay time for vehicles traveling along I-77 would drop from 47 minutes to 30 minutes, a reduction of 17 minutes (36 percent).

2.2 PM PEAK HOUR (NORTHBOUND)

The level of service for I-77 northbound operations will also improve by two levels when compared to 2013 No-Build conditions. Similar to the AM peak hour, the level of service would improve from a level of service “F” to a level of service “D” at ramps and from level of service “E” to level of service “C” for mainline operations.

For entire I-77 network, the average travel speed would improve by six mph, from 44 mph to 50 mph. Overall vehicular delay time for vehicles using I-77 will decrease from 51 minutes to 35 minutes, a drop of 16 minutes (31 percent improvement).

2.3 TRAFFIC OPERATIONS ANALYSIS LANE DIAGRAMS

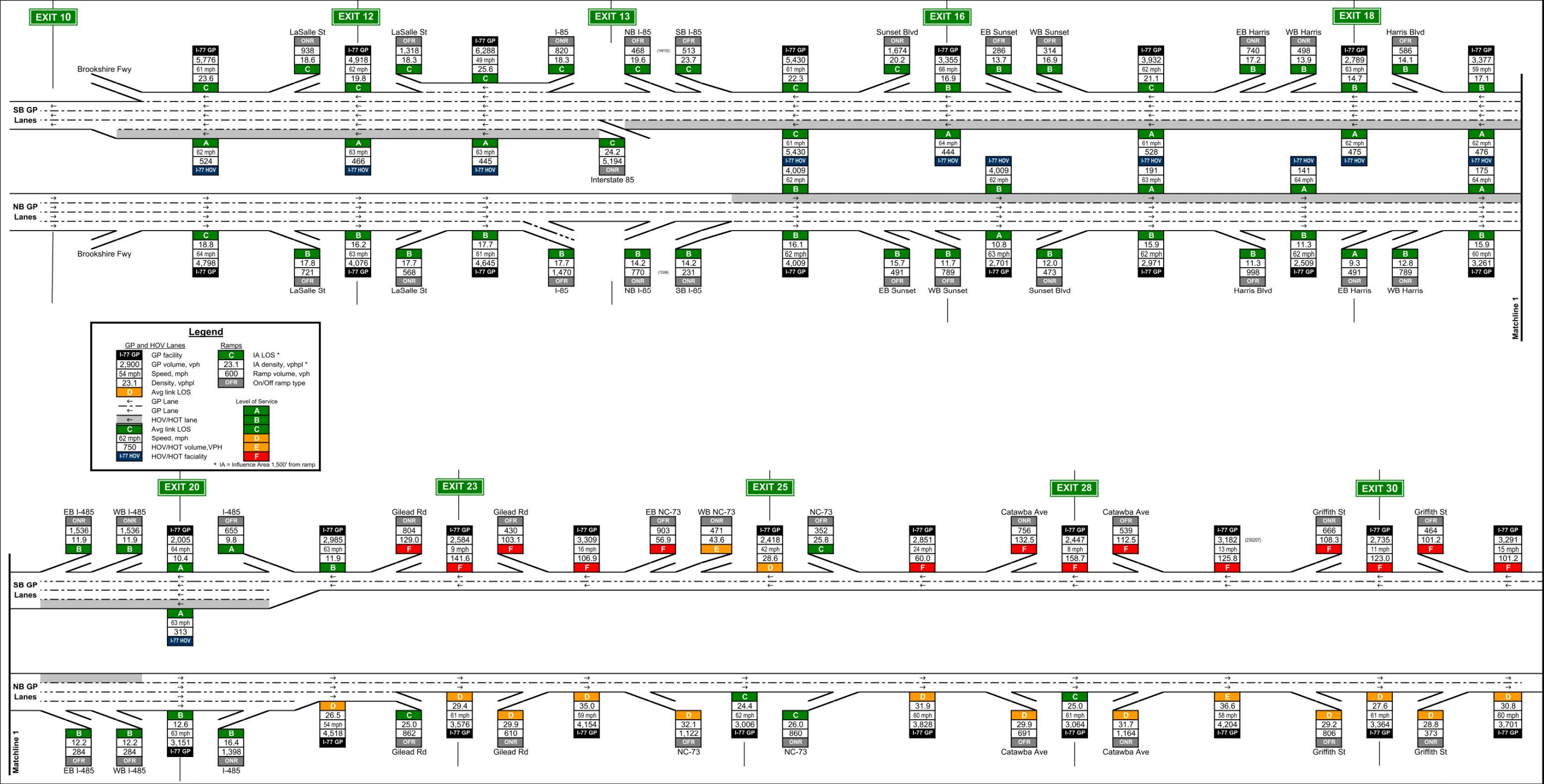
- The appendix, *I-77 CORSIM Traffic Simulation Results, Task Order No. 3 Alternatives*, includes a series of lane diagrams that depict the results of the CORSIM simulation analyses along the corridor. The lane diagrams show forecasted peak hour volumes, projected density and speed for mainline sections and modeled peak hour volumes for entrance and exit ramps. It also shows the expected operational levels of services for the various segments along the corridor.

APPENDIX

I-77 CORSIM Traffic Simulation Results

Task Order No. 3 – Use of I-77 Shoulders for Travel Lanes Alternatives

Figures	Year	Peak	Cross-section
Figure A-1	2013	AM	NoBuild
Figure A-2	2013	PM	NoBuild
Figure A-3	2013	AM	Shoulder Operation
Figure A-4	2013	PM	Shoulder Operation



I-77 HOV Study: CORISIM Model Volume Density and Speed Results

2013 AM No-Build

Figure A-1

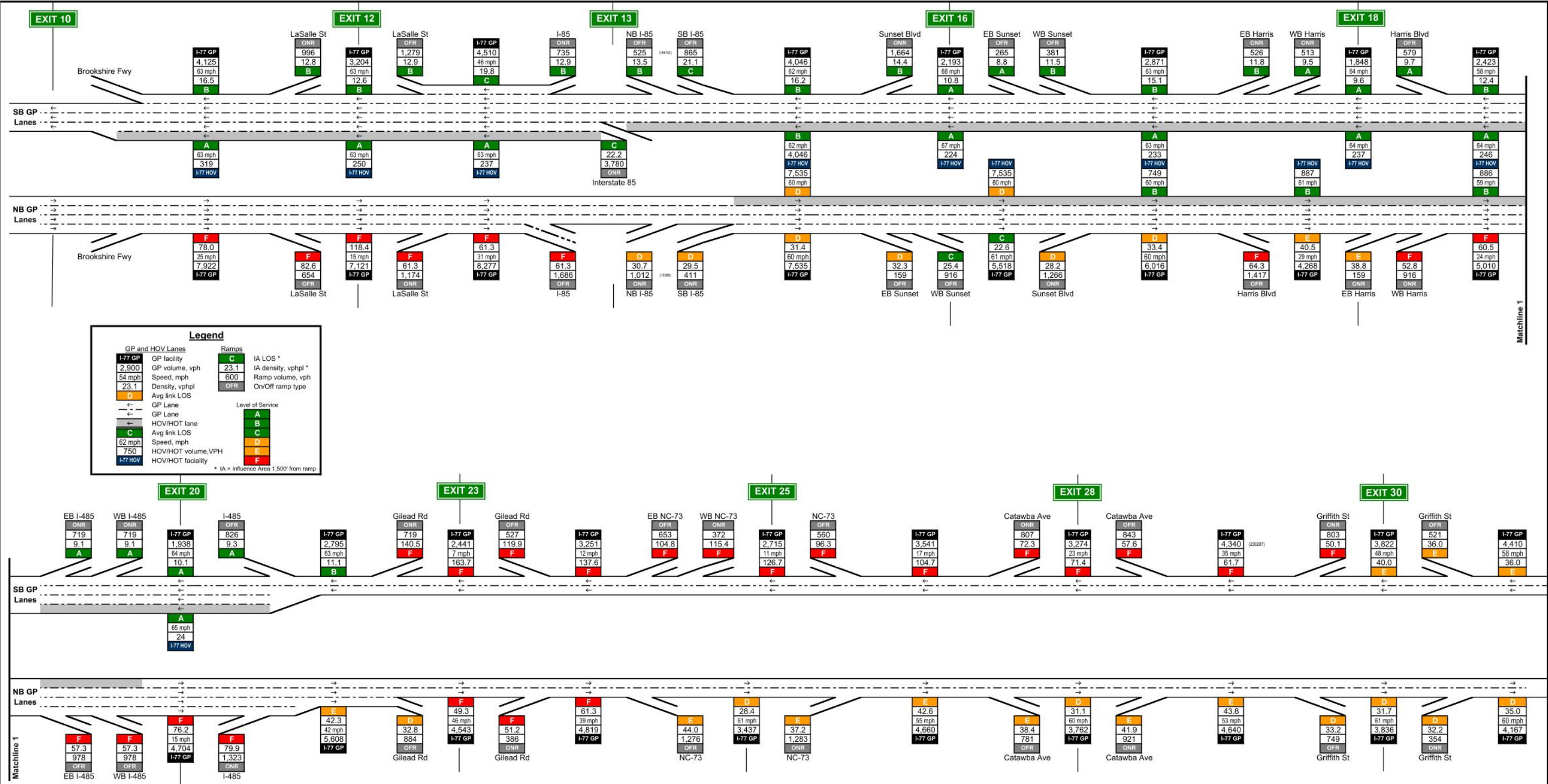
Location : I-77 between Exit 10 (Brookshire Freeway) and Exit 30 (Griffith Street)

AM Peak Period (7:00 a.m. to 8:00 a.m.)

Date: October 20, 2009

Created by: Dhiraj Goverdhanam

Approved by: Jonathan Reid



I-77 HOV Study: CORISIM Model Volume Density and Speed Results 2013 PM No-Build

Location : I-77 between Exit 10 (Brookshire Freeway) and Exit 30 (Griffith Street)
PM Peak Period (5:00 p.m. to 6:00 p.m.)

Date: October 20, 2009

Created by: Dhiraj Goverdhanam
Approved by: Jonathan Reid

Figure A-2

